Safety & Security

Exam Review

Flagging & Barricades

- Most common traffic & pedestrian warning systems
  *Flaggers
  *Barricades
  *Traffic Cones
- Flaggers should be 100 feet from work place
- Barricades should be placed at specific distances around the construction site
- Speed of traffic should affect spacing

On The Job Injuries

- Most commonly caused by failure to pay close attention to the job at hand
- You are responsible for your own personal safety
- Everyone is responsible for workplace safety
- Supervisor is responsible for the safety program

Trenching & Shoring

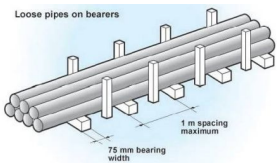
- Needed to prevent injury or loss of life
- 4 ft. deep requires a means of exit, usually a ladder.
- Exits or ladders must be provided at least every 25 feet.

Trenching & Shoring

- 3 basic means of preventing cave ins
  *sloping
  *shielding
  *shoring
- Trench wall protection is needed for all trenches 5 ft. deep
- Means of access egress for trenches deeper than 4 feet
- Ladders must extend 3 feet above the surface excavation
- Soil must be placed at least 2 ft. from edge of trench

Storage

- Pipe should be adequately blocked and stacked

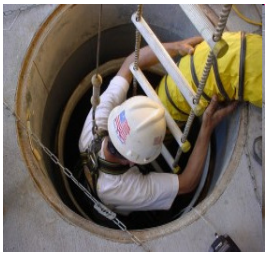


First-Aid

- For respiratory failure - know how to perform CPR.
- For bleeding - use direct pressure and pressure points.
- For 1st degree burns - use ice or cold water.
- For shock - lay victim down and cover them to keep them warm.
- Have annual training in CPR and First-Aid

Hydrogen Sulfide

- If you smell a rotten egg type smell in a pit, do not enter until proper precautions been taken
- Blowers are the most effective means to reduce atmospheric hazards
- Ventilate until proper oxygen levels are reached (minimum19.5%)



Vaults

- Considered hazardous
- Prone have condensation on electrical equipment
- They can collect toxic gases
- They are subject to flooding
- Calibrate air quality
- After ventilating, retest the air

Lockout/Tagged

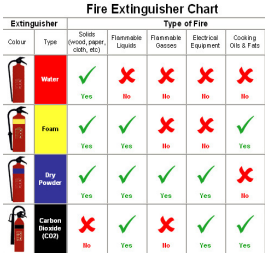
- Lockout & tag electrical panels, compressed springs, gear motors, distribution valves, moving equipment, etc. before repairing
- Even though the circuit may off, there is control voltage still active in panels
- Tag needs to by signed by the person placing it on the equipment & only they can remove it

Accident Prevention

- Conditions around worksite
- Attitude of the employees to safety
- Having an effective safety program

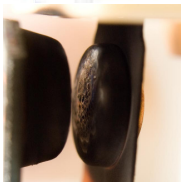
Fire Extinguishers

- Type A - Wood, paper, and other combustibles
- Type B - Fuels and oils
- Type C - Electrical equipment
- Type D - Metals
- For type C fires use dry chemical or carbon dioxide fire extinguisher
- ABC type for multiple use
- Don't use water base extinguisher on an electrical fire due to shock



Fuses & Breakers

- Found in electrical panels
- Determine the cause of the breaker tripping or the fuse blowing out
- Electrical contacts that are dusty & burned need to be cleaned to prevent fires

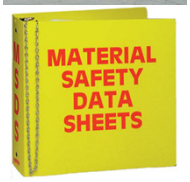


Electrical Motors

- Coupling guards protect from injuries
- Only trained staff should work on motors
- Lockout/tagout before working on

Management

- Should provide a safe working environment
- Should provide proper tools & equipment
- Should provide safety training
- Should provide Material Safety Data Sheets (MSDS) as part of right-to-know laws



Self Contained Breathing Apparatus

- Should be used on chlorine leaks
- Store away from but near chemical buildings
- Periodic inspections should be performed & records should be kept
- Length of time depends on breathing patterns of the operator

Treatment Plant Safety

- Operators should be familiar with electrical apparatus in the work place
- Operators should be familiar with chemical handling equipment
- Operators should have a knowledge of specific hazards unique to the facility

Well Head Safety

- Prevent contamination or pollution of the well
- Prevent accidents to operators

Chlorine

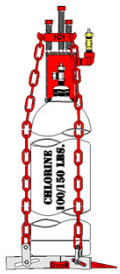
- **Gas is heavier than air**
- **Have eyewash/shower available**
- **Most leaks occur around control valve**
- **Cylinder liquid form expands 460 times**
- **When changing cylinders, shut gas off at cylinder first, evacuate lines**
- **Produces hydrochloric acid mixed with moisture**
- **Use rubber gloves & ventilate**
- **Should practice response once per year**
- **Inspect daily for leaks in system**

Vandalism

- A thorough investigation should be conducted
- Record the condition of premises
- Check water quality.
- Report damages and/or questionable conditions to supervisor.

Repair Kits

- A kit for 150 lb.
- B kit for ton cylinders
- C kit for train cars



Utility Vehicles

- Safety Equipment
- Proper tools
- Warnings flags
- Flares
- Flashlights
- First aid kits

Safety Inspection Reports

- Know who conducted inspection.
- Prevent overlooking safety features.
- Provides a record of who inspected the safety features of the equipment

Tank Safety

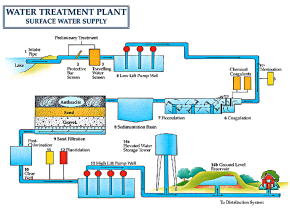
- Test the atmosphere in the tank prior to entry
- Use safety belts & harnesses when climbing
- Provide adequate ventilation while working inside

Vulnerability Assessments

- Systematic process to evaluate susceptibility
- VA's & ERP's viewed only by need to know personnel
- Determines types of assailants, threats, & probability
- Required for systems 3,300 or more

List Critical Components

- Source Types
- Treatment Plants
- Storage
- Power
- Distribution System
- Offices
- Communications



Source Water

- Ground Water
- Surface Water
- Purchased Water

Treatment Plant Inventory

- Buildings
- Pumps
- Equipment- Basins, Clearwell, Filters, etc.
- Process Controls
- Treatment Chemicals & Storage
- Lab Chemicals and Storage

Laboratory Safety

- Hazardous materials (acids, bases, toxic materials)
- Fire and Explosives
- Cuts and bruises
- Electrical shock
- Burns (heat and chemical)

Laboratory Safety

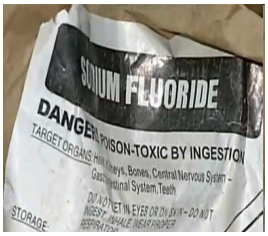
- **Beware of hazardous chemicals**
- **Use caution when cleaning up spills**
- **Use care when handling glassware**
- **Never pipet liquids with your mouth, use a rubber suction bulb**
- **Practice good personal hygiene**
- **Use Personal Protection Equipment**
- **Safety glasses, rubber gloves, apron**

Ferric Chloride

- Is a very corrosive material
- Should prevent splashing
- Use eye protection, rubber gloves, and protective clothing
- When spilled on skin, flush with large amounts of water

Fluoride

- Victims exposed to large amounts should me removed from area
- Operators should know the hazards contained in MSDS



Alum

- **Alum is a mild corrosive**
- **Use rubber gloves and dust-proof clothing**
- **Exposure to dry alum dust greater than 15 mg/m3 for more than 8 hours is considered hazardous**
- **Need respiratory equipment around dry alum dust**
- **Need eye protection (goggles)**
- **Ventilation**
- **Never use the same conveyor system for alum and quicklime**
- **Potential for explosion**

Caustic Soda Safety

- **Strong caustic alkali and very hazardous**
- **Very reactive**
- **Dissolves human skin**
- **Generates heat with when mixed with water**
- **Reacts with amphoteric metals generating hydrogen gas which is flammable or explosive**
- **Use special precautions when handling**

Chemical Safety for Acids

- Chemicals cause visible destruction or irreversible damage to skin tissue at the point of contact
- Swallowing can damage esophagus & stomach.
- Wear personal protective equipment
- Flush affected area with clean water
- Use sodium bicarbonate to neutralize acids
- Add acid to the water

Polymers

- Used as coagulant and filter aids
- Keep polymer dust off floors
- Will create very slippery surfaces when on floors
- Use inert, absorbent material such as sand to clean up spills

Potassium Permanganate

- Strong oxidizing agent, use caution
- Will react easily with organic materials
- Will ignite when in contact with antifreeze, sawdust compounds and many other materials
- All lubricants & fuels are potential fire hazards
- Store separately from other chemicals in a cool dry location
- Use dust masks and rubber gloves when handling & for cleaning up

Activated Carbon

- Is considered the most volatile powder
- Keep away from Cl2 compounds and KMnO4, possible spontaneous combustions
- The main problems are dust and fire control
- Will burn with intense heat, and without smoke or visible flame
- Keep electrical equipment clean
- Carbon dust can cause short-circuit fires
- Use explosion-proof electrical equipment

Explosions

- Don't use sawdust to absorb liquids
- Powder activated carbon is the most volatile powder
- Methane is the most common combustible gas

Water Storage Information

- Storage Tanks- Buried, Elevated, Above Ground
- Pressure Tanks- Hydropneumatic

Clear Areas

- Tall vegetation
- Overhanging trees
- Landscaping that can hide intruders
- Trim trees and shrubs
- Unobstructed view of critical facilities

Power Sources

- Primary Sources- Power Company
- Auxiliary Sources- Diesel, Natural Gas, & Gasoline Powered Generators.

Offices Inventory

- Buildings
- Computers
- Files
- Transportation- Work Vehicles

Communications Inventory

- Telephones
- Cell Phones
- Radio
- Computer Control Systems (SCADA)

Distribution System Inventory

- Pumps
- Pipes
- Valves
- Appurtenances- Flush Hydrants, Backflow Assemblies, Meters, Regulators, etc.
- Other Vulnerable Points
- Knowing your system is the best way to prevent contamination events & have alternate sources of water

Threats

- 3 stages of threat management are possible, credible, & confirmatory
- 2 side by side activities: threat evaluation and response decisions
- Survivability of a biological agent in the water determines the severity of an event & they are difficult to detect
- Smallpox is a pathogen that has a high rate of secondary transmission
- Examples of biotoxins would be botulinum, anthrax (bacteria), smallpox (virus), plague (bacteria), ebola toxins (virus), etc.

Disasters

- FEMA lists 3 classifications: natural, technological and national security
- Natural hazards are determined by geological location and do not occur as a result of something man-made
- Require resources beyond the capability of local government
- Cyber attacks would be considered technological
- SARA (superfund amendments & reauthorization act) is legislation requiring utilities to report chemicals stored on site

Credibility

- Collection of samples for analysis helps determine the credibility of a threat
- Analytical confirmation is the most reliable means of confirming a water contamination incident

Incident Command System

- A model tool for command, control & coordination of an emergency response to a public crisis
- Emergency Response to Life, Property and Environmental Incidents

Emergency Response Plans

- Preparedness phase in emergency management
- Actions a system would take during an event or disaster
- Assigns specific responsibilities to individuals and teams
- Sets a command structure
- Should be updated annually
- Prepared by local officials
- Elevating the threat level should be based on evidence such as a security breach, along with signs of contamination and abnormal test results

Emergency Response

- An action plan should be a short, concise summary of the emergency response plan
- Lists critical customers
- Accessed by need-to-know personnel only

Four Phases In Emergency Response Planning

- Preparedness- preparing emergency response plans
- Responses- are initial actions taken during an emergency or disaster
- Recovery-
- Mitigation- actions taken to prevent an emergency or to lessen the harmful effects of an emergency such as backflow prevention

Alarm Systems

- Alarm system that notifies authorities and system personnel of intrusion
- Should be considered for buildings, tanks, pump houses, & treatment facilities.

Key Control

- Interlocking locks
- Contractors keys
- Control key access to critical components of system
- Accountability for those having access
- Do not duplicate engraved on keys
- Change pass codes and retrieve keys when employees are terminated from employment

Neighborhood Involvement

- Raise awareness around facilities with flyers, bill stuffers, or personal interaction
- Notify neighborhood watch programs
- Disposable cameras
- Give call down list to neighbors of whom to call

Exterior Lighting

- Good deterrent
- Intruders can be seen and detected
- Motion Sensors
- Perimeter Lighting

Fencing Critical Infrastructure

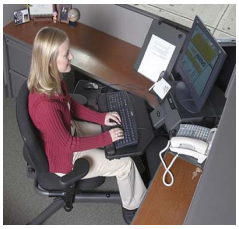
- All critical facilities should have perimeter security fencing
- Should be inspected frequently
- Secured with chains & tamper proof locks
- Concrete jersey barriers should be considered to guard against accidental or intentional vehicle intrusion

Cyber Security

- Hard wired systems are more secure than wireless systems
- Secondary passwords are designed to ensure at least two people are aware of changes being made to critical information technology programs

Computer Protocols

- Password protected and **changed every 90 days**
- Firewall protection
- Virus software that allows continuous upgrades
- Cyber attack is an example of a technological threat
- Backup files should be stored at an off-site location



Treatment Plants

- **Chemicals delivered with system personnel present**
- **Chemicals w/tamperproof seals**
- **Drivers I.D. should be checked by the operator**
- **Discuss security with suppliers**
- **Suppliers should background check their employees**
- **Store hazardous chemicals properly**
- **Monitor raw water**
- **Match all delivered goods with manifest and purchase order**

Warning Signs

- Hazardous chemical buildings should have secure & restricted access
- Facility Protected by Federal Law
- Unauthorized Access Prohibited
- Employees Only
- Authorized Personnel Only

Public Awareness

- Uniforms
- Employee I.D. cards for personnel
- System logos on water system vehicles
- Any critical items should be removed such as maps, computers, keys, tools, etc.

Methods of Estimating Contamination Spread

- Water flow analysis
- Hydraulic modeling
- Areas of customer complaints
- Field analysis
- Precursors to a contamination event can be on-line monitors that detect an unexpected change in pH and chlorine residual.
- Sarin is an example of chemical contamination

Distribution System

- Control use of fire hydrants and valves with locks
- Monitor system for constant positive pressure
- Implement backflow prevention program

Checklist

- How to handle threatening phone calls
- How to handle complaint phone calls
- How to handle suspicious activity reports
- Use of reverse 911 to warn public

Sensitive Information

- Remove sensitive information from Web
- Are maps, records and sensitive information in a secure location and labeled “Confidential”?
- Secure vehicles: maps, sensitive information, tools, keys, etc. could be stolen and should not be left in vehicle

Outreach

- How will you contact all customers within 24 hours of an emergency?
- Appoint a media spokesperson
- Contact nursing homes, hospitals, schools, & prisons or anywhere immune-compromised people may reside

Public Relations

- One spokesperson
- Restrict sensitive information distribution
- Procedure for public notification in the event of an incident
- Procedures for customer complaint calls on taste, odor, color or other physical changes in water quality

Questions?

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